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48980	7590	05/12/2010		
YOUNG BASILE 3001 WEST BIG BEAVER ROAD SUITE 624 TROY, MI 48084			EXAMINER LEE, BENNY T	
			ART UNIT 2817	PAPER NUMBER
			NOTIFICATION DATE 05/12/2010	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/558,150	Applicant(s) MORTAZAWI ET AL.	
	Examiner Benny Lee	Art Unit 2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 52-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 52-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2010 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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The disclosure is objected to because of the following informalities: In paragraph [0044], note that reference label (L_{N-1}) still needs a description in FIG. 2. Note that in the detail description of new FIG. 27 (i.e. in paragraph [0070]), reference (I_3) needs a description in FIG. 27 and thus needs clarification. Appropriate correction is required.

The disclosure is objected to because of the following informalities: Note that in the description of the circuits depicted in Figs. 1, 2, 3, 10, 13, 14, 15, 21, all reference labels which are unique to a particular drawing figure should be corresponding described in the specification for clarity of description. As noted earlier by applicants', any reference label appearing in a particular drawing figure and which has already been described relative to an earlier drawing figure need not be further described. Note that respect to the graphs depicted in Figs. 4, 5, 6, 8, 10, 12, 16, 17, 18, 20, 23, 24, 25, further elaboration of important aspects or features depicted by the curves in the respective graphs should be provided for clarity of description. Appropriate correction is required.

The drawings are objected to because of the following: Note that the replacement drawings filed 12 February 2010 have been found objectionable since certain drawing figures are still of such poor quality (i.e. as compared to the quality of the originally filed drawings), such that certain features and reference labels therein are not discernable as to what they represent and thus a new set of replacement drawings need to be provided; In Fig. 13, note that reference labels --2(G-jB)-- & --3(G+jB)-- still need to be provided such as to be commensurate with the specification description thereof.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet,

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even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim 54 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 54, it is noted that “the series impedance” lacks strict antecedent basis and thus needs clarification.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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Claims 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirino in view of Mantele (both of record).

Kirino {e.g. Fig. 7(b)} each disclose a one dimensional phase array antenna (e.g. 801) comprising a plurality of series connected or cascaded phase shift elements (e.g. 805a, 805b, 805c) defining a plurality of divider ports located between adjacent phase shift elements separated by a prescribed distance and to which respective antennas (e.g. radiating patches 804a-804d) are connected. An alternating signal source (e.g. an un-shown signal source connected to feeding terminal 807) is connected to a first of the divider ports for supplying a signal to the phase array antenna through the series connected phase shift elements. Note that as the signal applied by the source propagates through the series connected phase shift elements, each phase shift element imparts a desired amount of phase shift (e.g. phase shift Φ in Kirino) as to provide a successive phase difference to the propagating signal at each dividing port such that the signal is radiated by the corresponding antenna with the different amount of phase shift. Moreover, as described at column 17, lines 57-62, the radiation impedance at each patch (i.e. antenna) and a matching ratio of the each matching device (i.e. 812) are selected to that a leakage electric power from each patch is the same (i.e. the power is equally divided at each antenna patch). However, the phase array antenna of Kirino differs from the claimed invention since the phase shift elements do not explicitly disclose first series tunable elements and second tunable elements shunt connected to a respective antenna.

Mantele discloses, with respect to Fig. 1, a phase shifter configuration comprising a transmission line (i.e. 50) defined by serially aligned distributed parameters and parallel connected varactors (i.e. 52, 54). Note that transmission line (50) is considered “tunable” by

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virtue of being designed to a different inductive reactance and where the varactors are considered tunable by the application of control voltage (64) to change the capacitance of the varactor as depicted in the general description of Fig. 5. Moreover, it should be noted that such series connected inductors, by virtue of the designed inductive reactance, would necessarily provide an impedance inversion from one end to an inductor to the other end of the inductor, as known to those of ordinary skill in the art.

Accordingly, it would have been obvious in view of the references, taken as a whole, to have realized the series connection of phase shift elements in the phase array antenna of Kirino to have been realized by a series connected phase shift configuration as taught by Fig. 1 of Mantele. Such a modification would have been considered an obvious substitution of art recognized equivalent series connected phase shift configurations, thereby suggesting the obviousness of such a modification. It should be noted that the series connection of plural phase shift elements as taught by Mantele would obviously have been compatible with the series connection of the generic phase shift elements in Kirino, thereby further suggesting the obviousness of such a modification. It should be noted that as an obvious consequence of using the series connected phase shift elements of Mantele, such a combination would have necessarily included the respective varactors being connected in parallel with the corresponding antenna, such as to have been consistent with the teaching in the primary reference (i.e. plural antennas) such as modified by Mantele (i.e. shunt varactors). It should be noted that for the transforming of the admittance to the conjugate impedance at each antenna port, while Kirino does not explicitly disclose such an electrical effect, such an effect, by virtue of the selecting the impedance (and thus the admittance) of the antenna and the impedance matching circuit, those of ordinary skill in

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the art would have found it obvious to have selected a conjugate admittance as a desirable impedance characteristic, especially since selecting the conjugate admittance would necessarily compensate for the imaginary component of the impedance, thereby leaving the real component of impedance at each antenna port and thus would have resulted in the same magnitude of signal at each antenna port across the circuit. Moreover, as known to those of ordinary skill in the art, the transmission line can be alternatively be realized by series inductors designed to a desired length (e.g. quarter wavelength corresponding to a desired inductive reactance) as an obvious design consideration. Similarly, by virtue of designing the two inductors to be quarter wavelength each, the corresponding electrical length of the equivalent transmission line would obviously have been one-half wavelength, thereby providing a half-wavelength distance between adjacent antennas through the series connected phase shift elements.

Applicant's arguments filed 12 February 2010 have been fully considered but they are not persuasive.

With respect to the above rejection, applicants' have made the following contentions:

ARGUMENT A: that the combination of Kirino with Mantele would result in a transmission line with significant electrical length, that Kirino, being a fixed non-tunable matching circuit would not be able to cope with line impedance variation, thereby resulting in unequal power division at the antenna ports, and applicants' extended resonance circuit would use a very limited number of tunable impedances as opposed to the hundreds in Mantele, while maintaining impedance match across the ports;

ARGUMENT B: that the phase shifter in Mantele can not be automatically combined with the circuit in Kirino because of the inability of Kirino to cope with the variation in line

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impedance created by the combination, thereby resulting in unequal power distribution across the circuit, and that for the desired phase shift, the antenna and/or matching network would need to be designed separately for each stage as contrast to the same antenna design for applicants' extended resonance circuit thus allowing for scaling of the circuit;

ARGUMENT C: that the references are silent as to any teaching or suggestion of how one of ordinary skill in the art, in the absence of applicants' invention, would go about choosing the required conjugate impedance, and that the examiner may be confusing conjugate admittance with conjugate matching.

In response, applicants' assertions have found unpersuasive by the examiner and the examiner offers the following rebuttal:

ARGUMENT A: Regarding the significant electrical length of the transmission line and the hundreds of tuning elements required resulting from the combination, such arguments would not be commensurate with what is positively claimed (i.e. the claims include no explicit limitation as to the line length or the number of tunable elements required) and regarding the inability of Kirino to cope with impedance variation, such appears to be an unsupported assertion (i.e. applicants' have not provided any further documentation to buttress such an assertion);

ARGUMENT B: Regarding the inability of Kirino cope with variation in line impedance thereby rendering the combination as being inappropriate, the examiner reiterates the unsupported nature of such an assertion (i.e. see rebuttal in **ARGUMENT A**) and regarding the assertion that the antenna & matching networks must be separately designed for each stage, such an assertion is not commensurate with what is actually claimed (i.e. the claims do not positively require the same design for each section of the circuit);

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ARGUMENT C: Regarding the lack of teaching or suggestion for transforming of the admittance to the conjugate admittance at each antenna port as set forth in the above rejection, while Kirino does not explicitly disclose such an electrical effect, the examiner reiterates that by virtue of the selecting the impedance (and thus the admittance) of the antenna and the impedance matching circuit, those of ordinary skill in the art would have found it obvious to have selected a conjugate admittance as a desirable impedance characteristic, especially since selecting the conjugate admittance would necessarily compensate for the imaginary component of the impedance, thereby leaving the real component of impedance at each antenna port to provide for the constant magnitude of signal across the circuit. It should be noted that in this rejection, the examiner has gleaned the reason or rationale for applying the conjugate admittance from common knowledge in the art and thus has not engaged in impermissible hindsight reconstruction (i.e. the examiner has not gleaned this teaching/suggestion solely from applicants' disclosure). Furthermore in light of the recognition of the conjugate admittance and the manner in which it was applied, there is no confusion on the examiners part as to how this concept was applied in the above combination.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication should be directed to Benny Lee at telephone number 571 272 1764.

**/BENNY LEE/
PRIMARY EXAMINER
ART UNIT 2817**

B. Lee